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Life Is Too Short to RTFM: How Users Relate to Documentation and Excess Features in Consumer Products

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This paper addresses two common problems that users of various products and interfaces encounter—over-featured interfaces and product documentation. Over-featured interfaces are seen as a problem as they can confuse and over-complicate everyday interactions. Researchers also often claim that users do not read product documentation, although they are often exhorted to 'RTFM' (read the field manual). We conducted two sets of studies with users which looked at the issues of both manuals and excess features with common domestic and personal products. The quantitative set was a series of questionnaires administered to 170 people over 7 years. The qualitative set consisted of two 6-month longitudinal studies based on diaries and interviews with a total of 15 participants. We found that manuals are not read by the majority of people, and most do not use all the features of the products that they own and use regularly. Men are more likely to do both than women, and younger people are less likely to use manuals than middle-aged and older ones. More educated people are also less likely to read manuals. Over-featuring and being forced to consult manuals also appears to cause negative emotional experiences. Implications of these findings are discussed.

RESEARCH HIGHLIGHTS

- Two sets of studies investigating use of manuals and excess interface features, one large quantitative and one longitudinal qualitative.
- People claim to read the manual and use all of the features of many common domestic and personal products only 25% of the time.
- Men are significantly more likely than women to claim reading of manuals and use of all features.
- Younger people are significantly less likely to report reading of the manual.
- More educated people are less likely to read the manual.
- Excess features are associated with negative affect whereas core features are associated with positive affect.
- Reading of manuals appears to cause annoyance and negative emotional experiences.
- Implications of these findings for the development of interfaces and design of documentation in the 21st century are discussed.

Keywords: user centered design; user interface design; empirical studies in interaction design; accessibility

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1. INTRODUCTION

Users face constant increases in complexity in the products and interfaces they use everyday, many of them related to increased features in the interfaces. To address this issue, they are expected to use documentation to assist them. This paper explores what users really do with features and manuals when using real products and interfaces during their everyday lives.

1.1. Documentation

The acronym RTFM ('read the field manual', or more rudely 'read the f***ing manual' (Wikipedia.org, 2013)) is often used to exhort users to refer to user manuals, but several authors have claimed that this is often not what people do. For example, Cushman and Rosenberg (1991) cited a list of authors from the late 1970s and early 1980s who all claimed that manuals were not read. However, most of these would have been working on pre-GUI systems and products very different from the 21st century products we discuss here. In addition, many people working in this field based their claims on how people behave with manuals when presented with them as part of a set task in a lab environment (e.g. Brockman, 1990; Carroll, 1990) but did not investigate whether and how they use them with their own products in real life. A look at the more recent research into the twin questions of whether people read manuals when given the choice and how they read them when they have to follows.

1.1.1. Do people read manuals?

Clarkson (2007) conducted an online poll of >15 000 university staff and students about how they preferred to learn about a Learning Management System (Blackboard). Poll results displayed online on 28 November 2008 are shown in Fig. 1. These live-updated results were displayed online for around a year and remained consistent to within 1–2% throughout that time. Figure 1 shows the tendency for these users to completely avoid online manuals, help and assistance services when interacting with the system. The clear preference is for users to approach learning of the system through exploration.

In 2013, after a help page became available, a similar poll was released on the same website asking a very similar question to staff rather than staff and students. This one was live for only around 6 months. Results as displayed online in June 2013 are shown in Fig. 2. More than 63% of staff that responded had not accessed the help, and half of those who had did not find it helpful.

Schriver (1997) conducted a study of 201 participants, who were surveyed about their use of manuals for VCRs, answering machines, cordless phones and stereo systems as they walked out of electronics stores in the USA. She found that only 15%

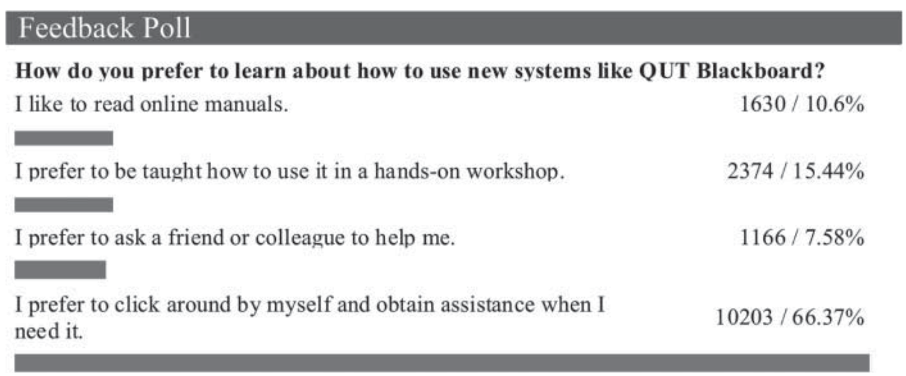

Figure 1. Screen-shot of a poll to university students and staff about how they used an LMS (2007).

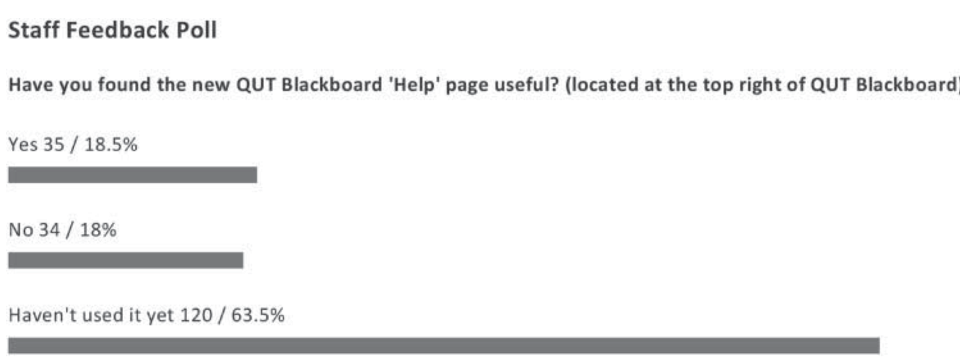

Figure 2. Results of poll to staff on using blackboard help page as at July 2013.

of respondents read the manual cover to cover, 46% scanned it, 35% read it as a reference and 4% never read it. Since descriptions such as ‘scanning’ and ‘read as reference’ could equate to what other researchers or participants interpret as ‘reading’ the manual, this study is somewhat difficult to draw conclusions from, although it obviously did show that very few people read them in full. There were also differences between types of products—92% had read the manual for their VCR to some degree, but those for phones and answering machines were less likely to be read. Schriver suggested that people are less likely to read manuals if they believe a product should not need instruction.

Smart *et al*. (2001) found in a telephone survey of 400 users of a word-processing program that 92% of users said they used printed documentation for the software at least once a month and 54% used online help at least once a month. Only 1% indicated that they never used a printed manual, and 35% never used online help. However, these results may be somewhat affected by the fact that only 17% of the respondents had used the program for >6 months. All had returned the registration card for the software (this is how they were contacted), so the sample may have contained a high proportion of people who prefer to thoroughly look through information (potentially including manuals) and complete forms when they receive a new product. Smart *et al*. (2001) also conducted an interview study with 18 participants, which again suggested that the majority do use manuals.

Wright (1981) conducted a survey of 48 adults, asking them how much instructional material they would read for up to 60 different products. Products here included food, tools and household products such as shampoo as well as electronic products such as watches, irons and VCRs, which she classified into types. She found that for complex electrical products like VCRs, 75% of participants claimed to read all instructions, 7% some and 18% none. For simple and battery-powered electrical products, the percentage reading all instructions was 59 and 58, respectively. Therefore, according to her survey, most people were reading all instructions for electrical products whereas for non-electrical items such as food, tools and washing products, <50% of people claimed to read all instructions, and between 30 and 50% claimed to read none.

Therefore, although there has long been a general assumption that users do not read manuals, there is not in fact a consensus, and very little work has been done in this area in recent years.

1.1.2. Why do people have trouble with manuals?

However, despite this lack of consensus, there does appear to be a general agreement that manuals are not easy to use and need improving. Schriver (1997) found that when people did read manuals, they were frustrated by them and often found them unhelpful, generally (60% of the time) blaming themselves for this regardless of their age or gender. Smart *et al*. (2001) found through their interview study that there were negative perceptions about manuals, both printed and online, and problems with using them. Problems included: it was unclear where to find information; not enough or irrelevant information; application-specific conventions made accessing information difficult; documentation made incorrect assumptions about what users knew; structure and layout made navigation difficult, especially in online help; poor or misused metaphors were confusing and the documentation used inconsistent or confusing terminology.

Much of the work carried out in the documentation field has been about how to help people to use manuals by making them better and has often involved task analyses or observations of participants using manuals alongside products in a lab. Sullivan and Flower (1986) conducted an early study using observation and concurrent verbal protocol. Six participants conducted real tasks with manuals and computer systems. Their study showed that users do not read the whole manual, or any section in its entirety, instead they stop using it once they have found enough basic information to begin the task and would rather reason out the task than follow involved instructions. No one read the manual carefully; most began to read the screen before the manual, only using it to answer questions when they failed. They did not read the introduction first, if at all, even though it may be short. Similar findings were achieved by Carroll (1990) over several studies, leading him to develop new approaches to manual design, such as the minimalist manual. These findings from Carroll’s observational studies back up the survey studies of Schriver (1997) and Wright (1981), concurring that users read only parts of manuals.

Other authors in this field concurred that most people constantly skip ahead and begin to use the system without reading the entire manual (Spannagel *et al*., 2008). Rettig (1991), citing heavily the work of Carroll (e.g. Carroll, 1990; Carroll *et al*., 1987) suggested that one of the reasons why people do not engage properly even with well-written manuals is because they can only gain understanding through the effectiveness of their actions in the world. The world they are in is more real to them than a series of steps on a page and provides rich context and conventions for everything they do. People try things out, think them through and try to relate what they already know to what is going on (Rettig, 1991). Therefore, most people just start using a system, turning to the manuals only when they are stuck or the system does not conform to their expectations. For computer systems, print or online help is seen as a last resort (Rettig, 1991), after repeating steps, rebooting and asking co-workers for help. Brockman suggested that reasons for this included that adults are impatient learners who rarely read instructions fully, are best motivated by exploration and learn from mistakes. They are intimidated by large manuals full of detailed tasks (Brockman, 1990).

Redish suggested that the problem relates to the type of reading people are accustomed to. ‘Reading to do’ happens when a reader’s primary goal is to extract information for immediate action (Redish, 1989). In this context, information can be forgotten once it is applied. It is stored in the book/manual so does not have to be stored in the head. Students mostly read to learn whereas workers mostly read to do. When reading to do, people seek information that helps them to conquer their goals/tasks. Help systems that use reading to do are more likely to help users reach their goals (Varland and Svensson, 2006). However, people often do not learn how to read to do, and many authors of manuals do not write for reading to do.

1.1.3. Can people access help when required?
Availability of manuals can also be an issue in some cases. For miniaturized devices, there is a lack of equally portable external support materials to provide user guidance and training (Kaufman *et al.*, 1996). This problem has been addressed to some extent in recent years, with instruction manuals stored in the device itself or accessible online. However, full print manuals are now often not shipped with electronic devices. ‘Quick start’ leaflets are provided, and it is assumed that users will access manuals online as needed. This forces users to use another system (e.g. a computer on the Internet) in order to use their products (e.g. a smart phone). The proliferation of training and courses offered by retailers of electronic products such as digital cameras, and the ‘for dummies’ series of manuals, which includes a series on electronics/consumer products and another on computers/software (Wiley and Sons, 2013) is testament to the fact that manuals are not always available when they are needed, or easy to use when they are available. In workplaces, users are often trained at roll-out of a new system but users joining the organization later or changing jobs get only on the job training from co-workers (Rohlfs, 1998). In addition, manuals for office equipment are rarely made available to everyone that needs to use it.

New methods of providing help are now emerging. Apart from the plethora of informal and unofficial Internet forums that offer help and discussion about all sorts of devices, more official forms of online and distributed help are now available. For example, Telstra (the Australian national telecommunications company) is now marketing the provision of their free online ‘crowd support’ service (Telstra, 2013). Both members of the public and Telstra staff post answers to questions on a range of topics from pricing and plans to how to use tablets and smart phones, technical issues with email and mobile service access. However, advice does not always concur, is not always clear, does not come with illustrations and is not always available at all if there is no one who happens to be able to answer the particular question. Also, the system can take several days to yield a response. Apple, in contrast, is selling the AppleCare Protection Plan to go with their computers and smart devices. This is a paid service similar to an extended warranty and provides expert telephone technical support and additional hardware service options, including help with using iOS, Apple-branded apps and connecting to wireless networks (Apple Inc., 2013). They claim that most issues can be solved in a single call. This is an example of a major company taking advantage of its own overly complex products by selling advice on how to use them.

In a blunter approach, Telecom (the New Zealand national telecommunications company) is providing a series of ‘how to’ videos on their website and though TV advertising (Telecom, 2013). Microsoft is also providing hints about how to use new Windows operating systems through TV broadcasts of video demos that smoothly form part of the advertising for the systems (Microsoft Corp., 2013). This approach, while very non-specific, has the potential to effortlessly increase the vicarious familiarity of whole populations with certain operations and systems, making it easier for designers to make assumptions about what certain users may already understand and potentially helping users to have a better first time experience with these systems.

1.1.4. Summary
Much of the work conducted by documentation specialists has involved asking people to conduct tasks with manuals in order to evaluate how manuals are used and to improve manual design. This is a somewhat artificial situation as users in this case are provided with the manuals and often directed to use them. Despite this, there is a consensus that they do not use the manual thoroughly or as intended and that manuals are very often not providing what users need. This consensus appears to be the basis of the general assumption that users do not read manuals. However, in terms of whether people use manuals for their own products when they have a choice about it, there is less of a clear consensus. Only four large studies have been found (Clarkson, 2007; Schriver, 1997; Smart *et al.*, 2001; Wright, 1981), which have asked users whether or not they generally use manuals, two of these are >17 years old and two have focused only on computer systems. Three suggested most users do use manuals at least to some degree (Schriver, 1997; Smart *et al.*, 2001; Wright, 1981), and the other suggested that they do not (Clarkson, 2007). In addition, none of the existing studies of any type have investigated the effects of variables such as age, education and gender on manual use or looked at the impact that using a manual may have on the overall product experience. Our studies attempted to clarify these issues and to focus on contemporary products as well as computer systems.

1.2. Over-featuring

The issue of excess features on products and interfaces has been discussed by several authors. Various terms have been used to describe the proliferation of features on products and software. Anton and Potts (2000) used the terms ‘feature-rich’, ‘feature bloat’ and also ‘encroachment’. It has also been defined as ‘feature fatigue’ or ‘feature creep’ (Lee *et al.*, 2006; Rust *et al.*, 2006). Bishop (2008) defined ‘feature creep’ as continually adding new features without removing or re-structuring old ones and equated feature creep with ‘software bloat’, ‘scope creep’ and complexity in software design. Other authors interpreted feature creep as contributing to or being one aspect of ‘bloat’ rather than equating to it. For example, McGrenere and Moore

(2000) defined 'bloat' as 'the result of adding new features to a program or system to the point where the benefit of the new features is outweighed by the impact on the technical resources and the complexity of use', and 'creeping featurism' as 'the tendency to complicate a system by adding features in an ad-hoc, non-systematic manner'. Kaufman and Weed (1998) identified several aspects of 'bloat', including 'feature richness'. Varland and Svensson (2006) defined creeping featurism or 'featuritis' as 'the tendency for the amount of features in a software product to grow with each new version of the products'.

1.2.1. *Issues arising from over-featuring*

As a result of feature richness and bloat, it is not obvious how to accomplish a task, there is unnecessary information and doing a task becomes overly complicated, there is visual clutter, misuse of colour and other design elements. Bloat also leads to excessive learning time—the amount of effort needed to learn a feature is not commensurate with its utility. It also causes physical constraints—e.g. impacts on screen real estate (Kaufman and Weed, 1998).

As Rust *et al*. (2006) argued, 'the problem is that tacking features on to products makes them harder to use…the complexity they introduce to the task at hand can be mind-boggling'. The accumulation of features, although useful for a certain number of users who are technologically adept, simply increases the likelihood of errors for most users. Thus, 'not all features are equally valuable' (Anton and Potts, 2000). A new feature may produce a marginal functionality gain but a widespread usability loss (Bishop, 2008). Indeed, Norman (1988) stated that complexity probably increases as a square of the features—double the features, quadruple the complexity. Severe feature creep means that the rare features get in the way of routine tasks, as each new feature competes for users' attention (Bishop, 2008).

Bishop (2008) gave an example of an automated mailing product that he re-designed. On the wish list, from consumer requests, were features already present but too hard to find. McGrenere, Baecker and Booth (2002) gave a similar example from Microsoft Word.

Varland and Svensson (2006) and McGrenere and Moore (2000) used Microsoft Word as an example of a bloated product, and they questioned the relevance of many of the various options to different levels of users. McGrenere and Moore (2000) cited observation and data logging studies to support their claim that users of this complex software use very few of the commands available to them the majority of the time.

McGrenere and Moore (2000) conducted a study using questionnaires and interviews, aimed at discovering users' experience of bloat with Microsoft Word. Results showed that users were familiar with a lot more features than they actually used. On average, 27% of features were used, whereas 51% were familiar. McGrenere *et al*. (2002) tested a personalizable version of MSWord. They put their participants into two groups—feature keen and feature shy. Each group had equivalent levels of prior experience, and therefore, the keen and shy were seen as personality types. They found that both groups favoured the personalizable version but the feature shy experienced significant increases in feelings of control and satisfaction with the personalizable interface. They claimed that this shows that people are often unaware of what they do not know—e.g. of seven of their participants who did not know about the adaptive menus in MSWord 2000, six were feature shy. These results suggest that the feature shy was probably actually less familiar with the interface than they self-reported but were unaware of what they did not know, rather than being an actual personality type.

This interpretation of 'feature shy' concurs with Kaufman and Weed (1998), who noted that experience level may influence the effect of bloat on participants. Novices could be overwhelmed whereas experts would recognize interface elements more readily. McGrenere *et al*. (2002) also agreed that novice users are able to accomplish tasks more accurately and rapidly with a simpler interface than the full version. We have spent 13 years conducting experiments investigating intuitive use with participants with differing levels of technology familiarity (TF) and can confirm that relevant prior experience is the major contributor to intuitive, fast, error-free interface interaction (Blackler, 2008). Others have also found that prior experience contributes to faster, more accurate use of various interfaces (e.g. Langdon *et al*., 2007; Lewis *et al*., 2006).

1.2.2. *Contributing factors of over-featuring*

There are various reasons for over-featured interfaces put forward by different authors. Varland and Svensson stated that time and upgraded versions (legacy systems) can lead to software ending up a jumble of additional features. Causes of over-featuring also include eager/expert users who request added features (Varland and Svensson, 2006), and providing redundancy and customization options can also contribute (Kaufman and Weed, 1998).

According to McGrenere *et al*. (2002), '… having a long feature list is now seen as essential for products to compete in the marketplace'. McGrenere and Moore (2000) used the term 'feature war': applications competing for market share based on number of functions offered. Kaufman and Weed agreed that software companies use new features to distinguish their products. Customers want to get value for money and like to feel smart—so may buy more advanced products and services than they need, and the drive to incorporate new technologies is usually seen as more important than usability (Kaufman and Weed, 1998). Even App stores list new features prominently. A study which focused on users' choices before using a product found that:

> *As the number of features grew, perceived capability increased and perceived usability decreased. And overwhelmingly, participants thought the high-feature model offered the highest overall utility. It was the one they would choose to own*
>
> (Rust *et al*., 2006).

Essentially, this showed that people, knowing that more features added complexity, would still make a decision to purchase the feature-laden product over the simpler product because it represented increased potential capabilities. The same authors later explored how users assessed ratings of capability and usability and their overall product evaluations before and after using products. They found, as they had previously, that before they had actually used the products, potential capability in the form of long feature lists mattered more to participants than usability. However, once they had used the products, usability was more important for satisfaction rates and the more highly featured model was now rejected by most participants (Rust *et al*., 2006). This indicates that once users experience the products, they would choose those with reduced features.

However, there is some indication that some users are now becoming more aware of their own limitations in terms of feature richness. This is evidenced by a new approach to promoting the iPhone as having only useful features. Jonathan Ive, in his release of the iPhone 5s in 2013, claimed that it was not just rampant technology for technology's sake, that every component and process had been carefully measured and considered to make sure they were truly useful and would enhance the user's experience (Ive, 2013). This is an acknowledgement of sorts by the industry that products are often over-featured and are sold on features that people do not really need.

1.2.3. Summary

The research that does exist into over-featuring confirms that it happens and does cause usability issues and also that users are often unaware of what they do not know and what they really need in terms of features. The existing literature shows that over-featuring is a problem for many users, which is not being addressed by designers or usability engineers, possibly due to the push to use large feature lists as a selling point.

Despite a general agreement on the existence of over-featuring and the problems associated with it, only one study has been conducted that investigated the proportion of features that users actually use, which was limited to the Microsoft Word interface (McGrenere and Moore, 2000). No authors have conducted a large-scale survey on features that users actually use on a range of products outside of software, and none of them have compared the effects of variables such as gender, age, education and product type on feature use. There is also no research that looks at how over-featuring may impact on the emotional experience of products and interfaces over time. Therefore, there appeared to be an opportunity to outline more precisely some of the issues related to feature-rich products and their impact on both usability and people's emotional experience.

The next sections describe our research investigating the issues of manual use and over-featuring *via* a set of quantitative survey studies (Section 2) and two qualitative longitudinal studies (Section 3).

2. QUANTITATIVE STUDIES

The surveys described in this section were originally administered as part of our programme of research into intuitive interaction. This paper reports on a statistical re-analysis of these surveys to look specifically at feature and manual use. A 'feature', as the term was used for this research, is a feature of a product that is discrete from others, has its own function, location and appearance and can be designed separately from other features. A shutter button on a camera, a print icon on software or an earpiece on a stereo are all examples of features (Blackler *et al*., 2011).

2.1. Method

Since intuitive interaction is based on past experience (Blackler *et al*., 2010b), one of the variables we measured for all experiments was TF. To collect data on TF, we devised a questionnaire, which asked participants about their frequency and intensity of use of products and interfaces relevant to those they would encounter during the experiment (questionnaire available in the online supplementary material). Rather than simply producing a TF score from the questionnaire, as the experiments on intuitive interaction required, this re-analysis aimed to explore the scores for feature and manual use in order to explicate whether or not participants claimed to read manuals, and the proportion of interface features they used. Therefore, this paper is concerned only with the intensity component of the survey (Blackler *et al*., 2011; Hurtienne *et al*., 2010), which asked participants about their use of features and manuals when using a range of products and interfaces (Table 1). This re-analysis also aimed to discover any age, gender, education or product-type effects on use of features and manuals.

2.1.1. Apparatus and measures

TF Questionnaires were administered to participants either after an experiment session or as part of the screening process when recruiting participants. Regardless of how they were first administered, the researcher went through the questionnaire with every participant to ensure the answers were an accurate

Table 1. Products and interfaces included in TF questionnaires.

Products and interfaces	
Microwaves	Digital cameras
Ovens	Cameras
Dishwashers	Video cameras
Cooktops	Mobile phones
ATMs	Stereo systems
Web browsers	Personal stereos
Windows or similar OS	Personal digital assistants (PDAs)
Computers	Remote controls
Universal remote controls	Touchscreens

reflection of their actual experience. This was also done by O'Brien *et al.* (2011) and appears to increase the reliability of self-report, reducing the problem of people over-estimating their TF because they do not know what they do not know.

The questionnaires used for each of the four experiments were the same in structure but had two differences. First, they each listed different relevant products depending on which product was used in the experiment. Relevant products covered a range of domestic and office products and interfaces in use in the recent past (Table 1), which provides a good snapshot of people's use of complex interfaces.

The second difference was that some of the questionnaires had slightly different wording, with 20 asking whether participants used 'all of the features (you may even have read the manual!)' and the other 150 asking 'all of the features (you read the manual to check them)'. However, the next cell on all questionnaires indicated 'without the manual', so both of these wording versions indicate reading of the manual (Table 2). Also the researcher checked whether users had read the manual and ticked the correct box when going through the questionnaire responses with the participants. The questionnaires were scored as shown in Table 2 (a sample TF questionnaire is in the online supplementary material. Question 7 is the intensity component that was used for the re-analysis reported here).

2.1.2. *Participants*

One hundred and seventy participants completed the survey, 20 in 2001, 36 in 2002, 75 in 20030/4 and 39 in 2007. There were 79 males (46.5%) and 91 females (53.5%). Distributions of age groups and levels of education can be seen in Tables 3 and 4.

Table 2. Scoring system for questionnaires.

Terms used	Score
All of the features (you did/may have read the manual)	4
As many features as you could figure out without the manual	3
Just enough features to get by with	2
Your limited knowledge of the features limits your use of this product	1
None of the features—you do not use this product	0

Table 3. Participant education distribution.

Education	Frequency	Per cent
Postgraduate	69	40.6
Graduate	41	24.1
Diploma	20	11.8
High school	26	15.3
Data missing	14	8.2

Table 4. Participant age group distribution.

Age group	Frequency	Per cent
<25	15	8.8
25–34	60	35.3
35–44	36	21.2
45–54	32	18.8
55+	27	15.9

Table 5. Per cent of scores within all data.

Per cent within all data			
Score	Per cent	Binomial test P-value	95% CI
1	6.10	<.0001	(4.98, 7.38)
2	24.95	1.0000	(22.85, 27.14)
3	44.24	<.0001	(41.80, 46.71)
4	24.70	0.7955	(22.61, 26.89)

2.2. Results

To investigate the overall use of features and manuals, the distribution of scores was considered. Scores were calculated as detailed in Table 2. Scores of 0 were excluded since this corresponded to the product not being used. If the responses were equally likely, then the percentage of responses would be 25% for each score. Using a χ^2 goodness-of-fit test, the responses are not equally distributed across the scores ($\chi^2 = 467.76$, DF $= 3$, $P < 0.0001$). People are most likely to use as many features as possible without the manual (3 scores). Using a Binomial test, the percentage of 3 scores is significantly $>25\%$ ($P < 0.0001$). A 95% Binomial confidence interval for the percentage of people reporting a 3 score is (41.80, 46.71)%. The percentage of 2 ($P = 1.0000$) and 4 ($P = 0.7955$) scores is not significantly different to 25% and the percentage of 1 ($P < 0.0001$) scores is significantly $<25\%$ (Table 5).

To investigate the effects of education, age group, gender and product type on feature and manual use, a main-effects generalized logistic regression model was fitted to the data. A proportional odds ordinal logistic regression model was not appropriate for the data as the proportional odds assumption was not satisfied, as tested using a score test ($\chi^2 = 95.72$, DF $= 28$, $P < 0.0001$). From the analysis of deviance, education, age group, gender and product-type effects were all found to be significant (Table 6).

2.2.1. *Manual-related results*

Comparison of 3 and 4 scores was used to explicate the data about manual use as the 4-score question specifically stated that manuals were used and the 3-score questions stated they were not (Table 2). Table 7 compares the odds of using the manual (4 score) compared with not using it (3 score) across the levels of education, age group, gender and product type, respectively. In these tables of odds, estimates of odds in the third column that are significantly different to a value of one (i.e. odds are not the same) are indicated by a *, ** and *** at a 5, 1 and 0.01% level, respectively. Additionally, in the last column, odds with the same letter are not significantly different at a 5% significance level within each effect, whereas odds with different letters are significantly different at a 5% significance level. The 0 score was not factored into the analysis as this relates to products the participants had not used at all. Full outputs from the generalized logistic regression model can be seen in the online supplementary material.

2.2.1.1. Education. As indicated in the last column of Table 7, postgraduate degree holders were significantly more likely to not read manuals than all other education groups. Additionally, from the third column of Table 7, postgraduate degree holders and high school graduates were significantly more likely to not read the manual than read it. Postgraduates were 3.280 times more likely to not read the manual than read it, and high school graduates were 1.984 times more likely to not read the manual than read it.

Table 6. Type 3 analysis of deviance for the main-effects generalized logistic regression model.

Effect	DF	Wald Chi-square	Pr > Chi-square
Education	9	47.8648	<0.0001
Age group	12	48.4384	<0.0001
Gender	3	25.0811	<0.0001
Product type	18	47.4247	0.0002

2.2.1.2. Age. There is a significant difference between the youngest age group (<25) and all the others. The youngest group is significantly more likely to state that they have not read the manual than all the other age groups. Additionally, the youngest two age groups were significantly more likely to not read the manual than read it. The <25 age group was 5.546 times more likely to not read the manual than read it, and the 25–34 age group was 1.749 times more likely to not read the manual than read it.

2.2.1.3. Gender. Women were significantly more likely to claim they had not read the manual than men. Both genders were significantly more likely to not read the manual than read it. Women were 2.569 times more likely to not read the manual than read it, and men were 1.361 times more likely to not read the manual than read it.

2.2.1.4. Product type. The products listed in the questionnaires were clustered into groups using principal components factor analysis informed by subjective grouping based on expert subject area knowledge. The make-up of the groups is shown in Table 8. The seven types showed some significant differences. It can be seen in Table 7 that computer-related interfaces were

Table 7. Odds of a 3 score relative to a 4 score within levels of each main effect.

Effect	Level	Odds estimate	Odds with the same letter within each effect are not significantly different	
Education	Postgraduate degree	3.280***	A	
	High school	1.984***	B	
	Diploma	1.409	B	
	Undergraduate	1.334	B	
Age group	<25	5.546***	A	
	25–34	1.749***	B	
	55+	1.349	B	
	35–44	1.340	B	
	45–54	1.304	B	
Gender	Female	2.569***	A	
	Male	1.361*	B	
Product type	Cameras	2.485	A	B
	Computer related	2.305***	A	
	Complex kitchen	2.244**	A	B
	AV	2.018**	A	B
	Remotes	1.662***		B
	Ubiquitous	1.403		B
	Simple kitchen	1.354		B

*, ** and *** denotes significance at 5%, 1% and 0.01% significance levels.

Table 8. Make up of product-type clusters.

Product Type	Product
AV	Mp3 player/personal stereo
	Stereos with no remote
	Stereo or VCR
Cameras	Automatic cameras
	Manual cameras
Complex kitchen	Complex cooktop
	Complex dishwasher
	Complex microwave
	Complex oven
Computer related	Browser
	Computer
	Digital camera
	PDA
	PDA or palm
	Touchscreen devices
	Windows
Remotes	Stereo remote
	TV remote
	Universal remote
	VCR remote
	Other remote
Simple kitchen	Basic cooktop
	Basic dishwasher
	Simple microwave
	Simple oven
Ubiquitous	ATM
	Mobile phone

significantly different from remote controls, simple kitchens and ubiquitous products, in that people were more likely to not read the manual for computer-related products than for simple kitchens, remote controls and ubiquitous products. Additionally, people were 2.305, 2.244 and 1.662 times more likely to not read manuals for computer-related products, complex kitchens, AV devices and remotes, respectively, than read them.

2.2.2. *Feature-related results*

Comparison of 4 and 1 scores was used to interrogate the data around feature use, as the 4 score related to all the features being used and the 1 related to very limited use of features. Table 9 compares the odds of using all features (4 score) compared with using very limited features (1 score) across education, age group, gender and product type. A main-effects binomial logistic regression model was also fitted to the data with binary response corresponding to using all the features (4 score) or not using all the features (1, 2 or 3 score). This model was used to investigate the effects of education, age group, gender and product type on whether all features were used or not. Table 10 compares the odds of using all the features (4 score) compared with not using all the features (1, 2 or 3 score) across the main effects of interest.

2.2.2.1. Education. From Table 10, postgraduates were significantly more likely to not use all the features than use them compared with other education levels. Additionally, for all education levels, people were significantly more likely to not use all the features than use them. Postgraduates, undergraduates, diploma holders and high school graduates were 5.316, 2.360, 1.909 and 3.195 times more likely to not use all the features than use them, respectively.

From Table 9, postgraduate degree holders and high school graduates were significantly less likely to use all the features than a very limited number of features compared with diploma holders. Additionally, for all education levels, people were significantly more likely to use all features rather than using only a very limited number of features. Postgraduates, high school graduates, undergraduates and diploma holders were 3.195, 3.393, 4.733 and 8.300 times more likely to use all features rather than only a very limited number of features, respectively.

2.2.2.2. Age. For all age groups, people were significantly more likely to not use all the features than use them. Age groups of <25, 25–34, 35–44, 45–54 and 55+ were 5.789, 2.512, 2.432, 2.488 and 2.571 times more likely to not use all the features than use them, respectively. However, no one age group was more or less likely than any other to use all features compared with not using all features (Table 10).

There was a significant difference between the oldest age group and the second youngest in that the 55+ group were significantly less likely to have used all the features than a very limited number of features compared with the 25–34 group (Table 9). Additionally, all age groups were significantly more likely to use all features rather than using only a very limited number of features. Age groups of <25, 25–34, 35–44, 45–54 and 55+ were 5.016, 7.352, 4.120, 4.134 and 3.157 times more likely to use all features than only a very limited number of features, respectively. The two youngest age groups were also more likely to have a 3 score (when referenced against a 1) than the two older age groups (detailed 3-score results can be found in the online supplementary material).

2.2.2.3. Gender. Women were significantly more likely to not use all the features than use them compared with men. Additionally, both men and women were significantly more likely to not use all the features than use them (Table 10). Women were 4.091 times more likely to not use all features than use them and men were 2.138 times more likely to not use all features than use them.

Men were significantly more likely than women to have used all the features compared with only a very limited number of features. Additionally, both men and women were more likely to use all features rather than using only a very limited number of features (Table 9). Women were 3.187 times more likely to use all features rather than only a very limited number of features, and men were 6.475 times more likely to use all features than only a very limited number of features.

Table 9. Odds of a 4 score relative to a 1 score within levels of each main effect.

Effect	Level	Odds estimate	Odds with the same letter within each effect are not significantly different	
Education level	Postgraduate degree	3.195***	A	
	High school	3.393***	A	
	Undergraduate	4.733***	A	B
	Diploma	8.300***		B
Age group	55+	3.157***	A	
	45–54	4.034***	A	B
	35–44	4.120***	A	B
	<25	5.016*	A	B
	25–34	7.352***		B
Gender	Female	3.187***	A	
	Male	6.475***	B	
Product type	Complex kitchen	2.166	A	
	Remotes	3.738***	A	B
	Ubiquitous	4.383***	A	B
	Computer related	4.699***	A	B
	Cameras	5.171	A	B
	AV	5.319***	A	B
	Simple kitchen	8.703***		B

* and *** denotes significance at 5% and 0.01% significance levels.

Table 10. Odds of a 1, 2 or 3 score relative to a 4 score within levels of each main effect.

Effect	Level	Odds estimate	Odds with the same letter within each effect are not significantly different
Education	Postgraduate	5.316***	A
	High school	3.195***	B
	Undergraduate	2.360***	B
	Diploma	1.909***	B
Age group	<25	5.789***	A
	55+	2.571***	A
	25–34	2.512***	A
	45–54	2.488***	A
	35–44	2.432***	A
Gender	Female	4.091***	A
	Male	2.138***	B
Product type	Complex kitchen	3.941***	A
	Remotes	3.338***	A
	Computer related	3.280***	A
	AV	3.060***	A
	Cameras	2.612	A
	Ubiquitous	2.509***	A
	Simple kitchen	2.287***	A

*** denotes significance at 0.01% significance levels.

2.2.2.4. Product type. For all product types, except cameras, people were significantly more (∼2–4 times more) likely to not use all the features than use them. However, no one product type was more or less likely than any other to have people use all features compared with not using all features (Table 10).

In Table 9, people were significantly more likely to have used all features on a simple kitchen than a complex one compared with using only a very limited number of features. Additionally, people were significantly more (∼4–9 times more) likely to use all features of remotes, ubiquitous, computer-related, AV and simple kitchen-related products than using only a very limited number of features.

2.3. Discussion of survey studies

The results strongly suggested that most people do not use the manual or all the features on their products most of the time. Reported use of manual was not significantly >25%, so the survey studies showed that people are just as likely to report a score of 4 and thus have read the manual, as they are to have reported any other score. Although they are more likely to claim use of all features (4 score) than very limited use of features (1 score), participants are more likely to claim use of as many features as they can figure out without the manual (3 score) than any other response.

These findings have implications for the way in which products are designed and promoted. Products are promoted on their feature lists (Kaufman and Weed, 1998; McGrenere and Moore, 2000; McGrenere *et al*., 2002), and most are shipped with manuals and the associated assumption that manuals will be read. In fact, manuals are often not read, even those who do read them are unlikely to read them in full (Brockman, 1990; Carroll *et al*., 1987; Carroll, 1990; Rettig, 1991; Schriver, 1997; Spannagel *et al*., 2008; Wright, 1981), and all features are not used. This is something that consumer society needs to address in order to accurately meet users' needs.

2.3.1. Gender

Men were significantly more likely than women to use all the features and read the manual. Whether the gender differences are due to level of confidence or interest in using features, learning style/interest in reading technical information, or whether the men were exaggerating their own ability is not clear. Studies have shown that men do not tend to exaggerate desirable qualities more than women (Mesmer-Magnus *et al*., 2006; Paulhus *et al*., 2003), so it likely that there is a real difference.

However, no gender differences were found through the performance measures (time to complete set tasks, intuitive uses and correct uses/errors) in any of the four experiments into intuitive interaction which these participants undertook, or in TF score itself (Blackler, 2008; Blackler *et al*., 2010), or in any of our other experiments that used similar designs (Blackler *et al*., 2012). Therefore, it appears that reading of the manuals and claiming use of 'all' features for relevant products as men do does not significantly impact fast, intuitive and correct use of a new interface. Although total TF score is the main predictor of fast, intuitive and error-free use (Blackler, 2008; Blackler *et al*., 2010, 2012), it seems to be made up in a different way for men and women. This suggests that knowledge leading to a 3 score (figuring out as many features as possible) is just as useful for speedy, accurate and intuitive use as knowledge contributing to a 4 score (reading manual and using all features). Most of the products listed in the surveys had been used by the participants for a significant period of time, some for decades and most at least 1–5 years. Therefore, figuring out the features may be just as effective in the long term as using the manual for learning features and applying that knowledge to new interfaces, as these participants did in our experiments.

2.3.2. Age

The youngest group was more likely than all other groups to say they had not read the manual. O'Brien *et al*. (2011) used technology diaries over 10 days with low and high TF older adults and younger adults and found that older adults were more likely to read manuals and younger ones were more likely to use trial and error, which suggests that they may be more willing to explore. O'Brien *et al*. therefore saw manuals as important for facilitating technology use by older adults, and they suggested that the creation of manuals should focus on older users. However, our study has revealed what theirs missed due to its design—which is that in fact all people over the age of 25 were more likely to read the manual than those under 25. Therefore, manuals should not be targeted only at older people.

The oldest group were less likely to have used all the features than one of the younger groups (24–34). Lawry *et al*. (2010) found that younger people (18–44) have higher familiarity than older people (60+) with contemporary products and a better understanding of what they offer, so it makes sense that they would be more likely to use more features. Work is needed to investigate what can best be done to assist the growing older group in accessing 21st century technologies. The two younger age groups in our surveys were also more likely to score a 3 score (vs. a 1 score) than both the older groups. This may be indicative of more time and/or willingness to explore, and their higher familiarity may give them a more secure base from which to do this as they have some knowledge to guide their exploration. O'Brien *et al*. (2011) found that younger people were more likely to use trial and error than use a manual, so the higher three scores for this age group concur with their findings here.

It is possible that the most important reason for the differences is not age itself but the characteristics of the generations. Today's 70+ technology users may have come late to technology and so need more help than today's 50- to 60-year olds. Today's 70+ users also come from an education framework when they read more and relied less on TV and other non-written media. When the 50- to 60-year-old users in our study are in their 70s, they may not be like the 70+ users in the O'Brien *et al*. study. They may continue to be like their current selves in terms of manual-reading behaviour. As the current younger generations become the 'older adults' of tomorrow, they may continue to read less than the current generation of older adults.

However, in terms of use of features, it is likely that age itself has more of an impact. Because technology ages even faster than humans, the familiarity that the current middle-aged cohort has built up will not be as applicable to newer generation technologies as that of younger people. The disparity between older and younger people in technology uptake and aptitude is likely to continue to be an issue because it is caused by lower familiarity, plus cognitive and physical declines (Blackler *et al.*, 2012). All of these things will continue to happen to future generations as they age, although their attitude to reading manuals may be different.

2.3.3. Education

Education appears to have an effect on manual reading, with the most educated people being least likely to read manuals. This may be indicative of higher confidence in being able to do without the manual or a higher level of general knowledge on their part—i.e. they were less likely to feel the need to read the manual and more likely to feel they could work things out themselves. The highest educated group was also the least likely to use all the features. This may suggest a lack of time available to engage with domestic and consumer technologies, and/or a more efficient approach to their use of interfaces in order to maximize time. They may be more able to use their knowledge and strategies to select only essential features they need. Alternatively, more educated people may be more aware of what they do and do not know, and more accurate in claiming what features they use.

2.3.4. Product type

Product types had some interesting effects. In particular, it is interesting when comparing two levels of complexity of the same types of products (i.e. complex and simple kitchen appliances) that the features on the simple kitchen are more likely to be fully used than those on the complex versions. This suggests that complex kitchen appliances are over-featured in comparison with simpler ones as people are not using all the features available on complex ones, with many of them using only limited features.

In terms of manual use, it is interesting that people were less likely to use the manual for computer-related products. This is an important finding because many other studies into manuals looked at computer software. It would appear from our results that manual-reading behaviour is different for computer-related products than for many other types of products. This could be related to complexity of the different product types, the off-putting density of many software manuals, or ownership and/or access to the manual—few of us have access to full printed manuals for software we use at work, for example. Alternatively, people accessing contextual or online help through the software interface may not count that as manual use, whereas most domestic products, especially during the years these data were collected, still had paper-based manuals. However, although there are several potential reasons behind this result, it does mean that generalizing research about use of documentation for computer systems to other types of products may be unwise.

People were significantly more likely to not read manuals for computer-related products, complex kitchens, AV products and remotes, in other words the more complex product types. Interestingly, Wright (1981) and Schriver (1997) both found the opposite—that manuals for more complex products were likely to be more thoroughly read. This could indicate a shift in attitude over time—people were more willing to read manuals in the 1980s and 90s than they were in the first decade of the 21st century. Or it could indicate improved usability of complex technologies and/or increased familiarity of the population with them—people are not forced to read manuals in order to start using these systems as they were with earlier systems.

2.4. Conclusion for survey studies

The survey studies have shown that most people do not read manuals or use all the features available on many products, which is important because there was not previously a consensus on whether people read manuals for their own products, and there was a paucity of research about the features people use, save for one study on software. The survey study has also revealed definitive differences in age, education and gender in the ways in which people interact with the features on their products and use manuals, going beyond previous studies. It has also shown that there are differences in manual and feature use between some product types, suggesting that results about manuals and feature use may not be generalizable across product types, particularly between software and product interfaces. All of these issues are discussed further in Overall Discussion (Section 4).

3. LONGITUDINAL STUDIES

Two longitudinal studies were conducted during 2007 and 2008/09. The focus was on exploring people's emotional experiences with portable devices (Table 11) over a 6-month period within the context of everyday life. The purpose was to identify aspects that influenced the emotional experience in a positive or negative manner. Study 1 involved studying media/entertainment devices over a 6-month period and included nine participants. Study 2 focused on medical/health devices over a separate 6-month period and involved six (different) participants. Over 650 real-life Tasks related to

Table 11. Products included in the longitudinal studies.

Media/entertainment	Medical/health
Mp3 player	Pedometer
PDA	Heart-rate monitor
PDA with mobile phone capabilities	Blood-glucose monitor

emotional experiences were coded. A triangulation of methods was used to collect the data, consisting of interviews, experience diaries and co-discovery (iterative protocol).

The studies required participants to report on their experiences with their own new products, all owned for <2 months at the start of the studies. Participants also characterized how they felt emotionally about each experience. Russell's model of core affect (Russell, 2003) was used as the set of basic emotions the participants referred to in the interviews and diaries. Russell's model has been used as an effective self-reporting method in other studies investigating emotional reactions to products and had been used by the authors in previous research (Desmet, 2002; Fagerberg *et al*., 2004; Gomez, 2005).

For the purposes of this paper, comparison was made between participants' reactions to core and excess features, and also a re-analysis was done in order to locate examples of discussion about manual use.

3.1. Data collection methods

Interviews were used at monthly intervals throughout the 6-month period for both studies. A co-discovery session between two or three participants moderated by the researcher was also conducted at the end of the 6-month periods. Experience diaries were used to record ongoing experiences within everyday situations (Gomez *et al*., 2011). The experience diaries were designed as a modified version of the traditional structured interval-contingent diary technique (Wheeler and Reis, 1991), in which participants were asked to answer specific questions about their experiences with the devices once a week. Questions included: mood prior to interaction, context (location) of interaction, date of interaction, time of day, social setting (alone/with others), activity, and emotional evaluation of experience (full diary template can be found in the online supplementary material). The fundamental strength of diaries is that they allow the capture of changes and patterns of experiences in real-life contexts and help in determining the factors that affect this change (Bolger *et al*., 2003).

The data were analysed using a content analysis technique (Bauer and Gaskell, 2000; Flick, 2006). The analysis used Atlas.ti software to interpret the written and transcribed verbal data of participant experiences collected through the interviews, diaries and co-discoveries. To arrive at a coding scheme, it was important to identify different categories and sub-categories relating to the data sets. Once the sub-categories were outlined, they were collated into comprehensive groups, resulting in the emergence of the four categories of Core Features, Excess Features, Mediation and Auxiliary. For instance, this excerpt from a participant highlights an aspect of the product's interface, which was categorized under Excess Features Task:

> *I mean there are lots of features on it. For instance if it is a listed number that comes in you can get it to use one ring tone, if it is an unlisted number or unidentified caller you can get it to use another.*

Here, the participant highlights the capability of a phone to be set for one or two ring tones, depending on who is calling. The participant has identified this as an added feature of the product, and this instance would be coded as an Excess Feature Task. Excess Feature Tasks were those which related to features which did not perform the core functions of the product. The remaining categories were coded in a similar way. Core Features referred to Tasks relating to core functions of the product, for instance playing music with an Mp3 player. Mediation Tasks related to non-product-specific aspects, for instance when users utilized the product to 'escape' from daily activities or as a 'motivator' to exercise. Auxiliary Tasks were tertiary, or peripheral, types of activities, for example taking the product to get serviced or fixed or reading documentation.

Only Experiences that influenced or impacted the emotional experience, as stated by participants, were coded under Task Categories. Once these Tasks Categories had been established and coded, the data were interrogated again and findings deduced (Gomez *et al*., 2011).

3.2. Results

We found some interesting issues in relation to the effects that Excess Features may have on the user experience, and also in relation to Auxiliary Tasks, including activities where users referred to a brochure or manual.

3.2.1. Manual-related results

Although participants mentioned manuals at times throughout the 6 month studies, manual use was only linked to an emotional experience and coded as a Task (Auxiliary) on one occasion. This one Task with a manual was performed with a Medical/Health device and was classified as a negative experience. It is telling that no other participants over the course of 6 months indicated that using manuals or brochures influenced the emotional experience. This does not mean that they did not use manuals, but it is likely that uses were infrequent as they did not have much impact and when asked participants stated that these experiences did not influence them enough to affect their emotional experience (positively or negatively) and so they could not be coded as Tasks. However, when participants discussed and mentioned manuals, accessing help and other sources of assistance throughout the study, they generally discussed these from an unfavourable point of view. Some relevant examples regarding these types of interactions have been extracted from the interviews and diary comments. The quotes from participants indicate the unfavourable perception of using manuals and help-related activities (Table 12).

It is interesting to note that participant 9B acknowledged that the issue she was experiencing was probably outlined in the manual, but she was still not willing to use it. Participants 9B and 14D explained that they would prefer that the interface would just tell them how to do it rather than having to look it up. Participant 6B had an even more negative view

Table 12. Example responses relating to using the manual.

Participant	Quotes relating to dissatisfaction with manual-related experiences
9B	*I never really look at manuals. I mean it probably did say it in there and it is probably more my fault for not looking but I kind of like things to just tell me what to do.*
14D	*Yeah... I don't like reading manuals and things. I like it to be quite self-evident...*
6B	*It is not as user friendly as it could be I guess.... I have trouble with the controls, I just can't be bothered reading the manual [on] how to do things.*
7B (quote a)	*… iTunes has got several different [help sources], there's help, there's a manual and there's various websites that all give slightly different user information. I don't understand very well when I've got four different sources… So I have found that I have got a bit frustrated with trying to figure it out. I asked it to do something that I thought would solve my problems… and I plugged it in and it started automatically deleting everything… There was nothing in any of the texts I read that said part of this thing is it will delete everything… So I lost some stuff I wanted to listen to…*
7B (quote b)	*There's a tendency in a lot of products and services these days that are connected to the internet to not have instructions or information in one place... I had trouble with setting it up [since] the information was all over the place. When it didn't work properly I felt slightly defeated before I had even tried to figure out what was wrong because I knew there would be at least four different places that I would have to look and that if I went on [an internet] forum I wouldn't know what questions to ask.*

Table 13. Mean tasks for excess features and core features categories for male and female participants.

	Mean Tasks coded per participant	
Category	Male	Female
Core Features	16	11
Excess Features	20	20
Total	36	31

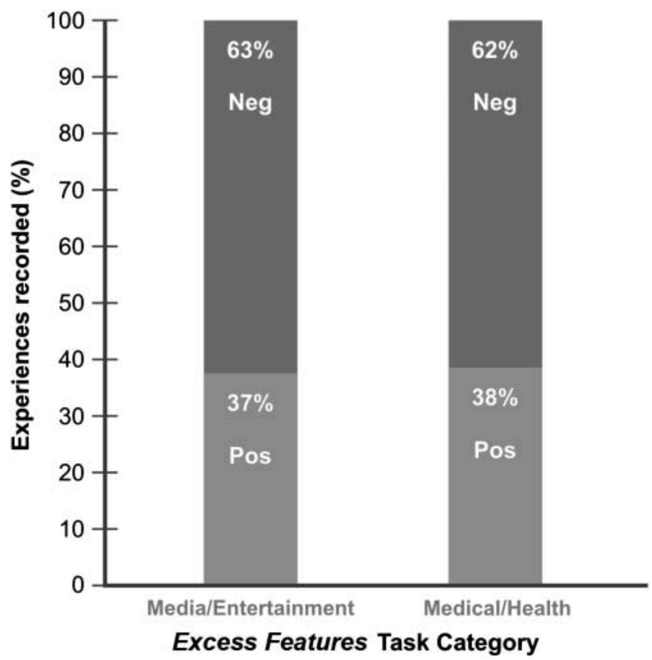

Figure 3. Overall percentage of excess feature tasks characterized positive and negative for media/entertainment (left) and medical/health devices (right).

of manuals. Here, the participant was having trouble with the device but acknowledged outright that she had a high level of dislike for using manuals, even if it meant misusing the device.

Further, despite a negative view of physical manuals, there was evidence that highly distributed and more casual sources of help, such as websites and internet forums, also do not necessarily work for users. For example, participant 7B (quote a) outlined the hurdles when it comes to dealing with various sources of information on the Internet. Similarly, participant 7B (quote b) explained the sense of confusion and negative emotions associated with trying to solve problems using sources such as internet forums.

3.2.2. Feature-related results

This section will use a comparison of the two Task Categories, Core Features and Excess Features, to highlight differences between the ways people perceive the essential and non-essential features of their products. It can be seen that Excess Features were the most mentioned for both device types, but there was no difference between males and females (Table 13).

Figure 3 shows the Excess Feature Tasks for media/entertainment devices (left) and medical/health devices (right) and the emotional responses for each. Participants responded mainly negatively to the Excess Feature Tasks.

Participant comments during interviews also highlighted negative responses regarding Excess Feature Tasks, suggesting

Table 14. Example responses relating to excess features.

Participant	Quotes relating to dissatisfaction with excess feature-related experiences
2A using PDA with mobile phone capabilities	*…the menu with commands like copy or paste or edit or purge is in a sort of secondary button on the phone and you have to raise a separate pull down menu in order to do those other things. And occasionally a call or a message has come in, and it has happened on two occasions now, and I have inadvertently operated the pop-down menu and I have just obviously pressed the wrong button to get rid of it… So I have had kind of a lot of negative experiences with it…*
11D using blood glucose monitor	*… well I should say that every week I actually have to um, go onto my computer, onto a spreadsheet that I've created, and I have to back through the device's memory and manually type in the data twice a day… All I've done is, you know, just track back through its memory and write down the time and then the reading. So that I guess is a bit of a pain that I have to do that every week.*

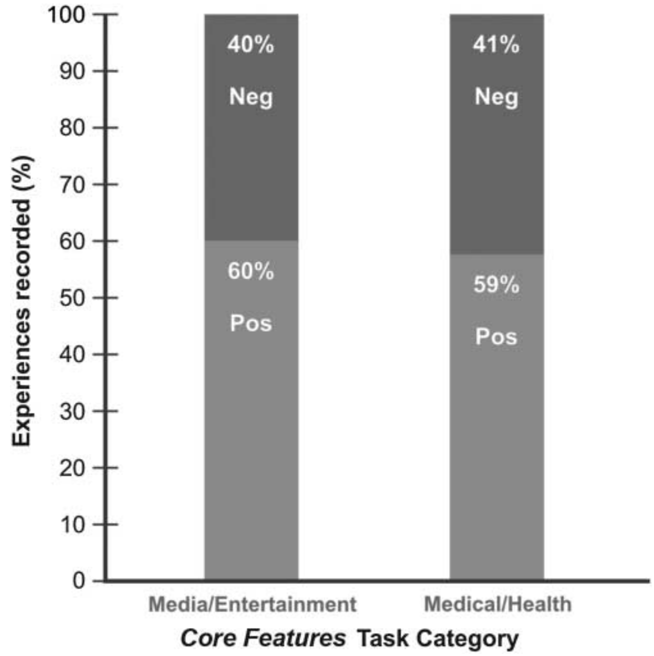

Figure 4. Overall percentage of core feature tasks characterized positive and negative for media/entertainment (left) and medical/health devices (right).

that users relate to these types of tasks generally in an unfavourable way (Table 14).

Although Excess Feature Tasks were mentioned negatively by participants, Core Feature Tasks were perceived in a positive light. Figure 4 shows the Core Feature Tasks for media/entertainment devices (left) and medical/health devices (right) and the emotional responses for each.

3.3. Discussion of longitudinal studies

This section looks separately at manuals and features results from the longitudinal studies.

3.3.1. Manuals

The lack of mention of manuals as contributing to emotional experiences during the 6-month studies and the quotes from participant interviews (Table 12) back up the quantitative findings that most people do not use manuals. This is very important when we consider that these participants were using products new to them—each owned for <2 months at the start of the 6-month period. Also, the proportion of men and women who commented that they do not use manuals is similar to the survey findings (three women and one man).

The findings identify two distinct aspects in relation to hurdles in using manuals and distributed help with interactive devices. First, there is a dislike for using manuals and help features for devices, even if it is known that a problem will be resolved using these sources. Second, findings suggest that users can have a negative emotional reaction and can become easily overwhelmed with the various sources of help available, so much so that it inhibits them from using any of the sources for assistance. Some people were so overwhelmed with the amount (as well as the perceived technical nature) of the information from various sources including manuals, websites and Internet forums that it prevented them from using them at all. Schriver (1997) noted that people choose to read manuals only when they believe there is some benefit in doing so and only when they cannot get the required result in an easier way. However, in this instance, the fact that help and assistance can be accessed from more than one source (and these sources have proliferated since Schriver's work in 1997) rather than providing an easier way actually added further hindrances that prevented people from accessing help.

The findings also suggest another reason for the lack of manual use—comments from several participants mentioned that they wished that the interface design was self-evident in terms of assisting them with what to do (Table 12). This is key as it provides some insight into why people do not use manuals. Not only did they not *want* to use the manual, they did not want to *need* to use the manual, they wanted the interface to be self-explanatory. Schriver also found that people considered that they should not need manuals for some products as they should be simple to use (Schriver, 1997).

The implications of this include re-considering how assistance and help might be delivered, supported and adapted for portable devices. This means a potential refocus of investment, resources and direction. Further, for the medical/health devices, it is important that negative experiences are minimized since they may impact negatively on the emotional experience of health recovery (Mayne, 2001) and also prevent proper use of the medical product.

3.3.2. Features

Excess Features was the most mentioned category for both men and women, although one might have expected participants to focus most on the core features of their products. This suggests that excess features were consuming a lot of participants' attention during use of their devices and having more impact on their emotional experiences than core features. Participants responded mainly negatively to the Excess Feature Tasks. This indicates that for both media/entertainment and medical/health devices, many experiences related to excess product features were perceived as negative and suggest that excess product features play a role over time in negatively impacting the emotional experience of interaction. This is not to say that all experiences with extra features were negative, but rather, when users chose to discuss them, or were asked to remember these types of tasks, the focus was more often on the negative aspects of the experience. This is important because, as Thompson, Hamilton and Rust (2005) argued '…empirical evidence indicates that consumers may experience negative emotional reactions, such as anxiety or stress in response to product complexity'.

Participants responded mainly positively to the Core Feature Tasks. This indicates that for both media/entertainment and medical/health devices, many experiences related to the core function of the device are remembered, or appear to be perceived as, positive. This indicates that over time experiences with core features of the device during the user–product relationship have a positive impact on the emotional experience of interaction.

Therefore, the results of the longitudinal studies suggest that people perceive manuals negatively and resent having to read them, which could be one reason why they do not do so. Also, the findings suggest that excess features are dominating the user experience (based on the number of emotional experiences reported) and causing negative affect. Therefore, reducing unnecessary product features may also reduce negative emotional experiences with products over time, as well as increasing usability (Bishop, 2008; Norman, 1988; Rust *et al*., 2006). It is also important to consider, if adding more features to medical devices, that the consequences could lead to reduced medical adherence and impact negatively on the user's overall well-being (Mayne, 2001).

4. OVERALL DISCUSSION

This research has provided strong support for what was previously an assumption that most people do not read most product manuals and that manuals are often viewed negatively. We have also shown that most people do not use all the features on many of their products and interfaces and that over-featuring can also cause negative reactions in users of such products, suggesting that many commercial products are in fact over-featured for most users. In addition, we have shown some significant differences in manual and feature use between genders, age groups, people with different educational backgrounds and different product types. We have provided solid evidence for our claims both through the list of domestic products presented in the survey studies to a large group over 7 years, and through closely investigating participants' interaction with individual portable products over the course of 6 months. This section builds on the individual discussions in Sections 2.3 and 3.3 in order to explore the implications of these issues for designers and users.

4.1. Discussion relating to documentation, help and assistance

The survey studies showed that people do not claim to read manuals for many of their own products. This holds for the various product types, and computer products and more complex products in particular. Our findings suggest that people do not read manuals because they find it a negative experience, overly complicated and they feel that the interface itself should tell them all they need to know. These findings should provoke a re-think of the make-up of consumer documentation. Help, assistance and the way these are delivered have to be reconsidered altogether. Should we even speak of 'manuals' anymore? In which cases are they not relevant anymore and in which cases are they relevant (e.g. for experts or professionals in some fields)?

The findings suggest that for consumer products perhaps the idea of 'manuals' should disappear altogether since it seems that people do not use them and do not want to need them. Users' rejection of manuals, which is more pronounced in our study and that of Clarkson (2007), and less in earlier studies (Schriver, 1997; Sullivan and Flower, 1986) may be a result of the evolution of technologies. Schriver (1997) and Sullivan and Flower (1986) found that manuals were not a first resort. Maybe this trend has been accentuated over the past 2–3 decades and trial and error is becoming more of an option and more likely to be attempted before using the manual and/or is more likely to be successful. The more forgiving nature of contemporary products and more user awareness of usability may have contributed to an attitude that one should not need to read a manual to use a 21st century product.

Men are more likely than women to claim they have read the manuals. Currently, it is unclear what the reasons behind this may be as, although these findings were repeated in the qualitative studies, there were not enough comments about manual use to be able to pick apart the differences in motivation between men and women. However, although TF score is so important for intuitive interaction (Blackler *et al*., 2010b), how it is made up (with a focus on 3 or 4 scores) does not have an impact on fast and intuitive use, since we never found a gender difference in intuitive uses, time on task or errors in any of the experiments with these same participants (Blackler, 2008). This finding suggests that reading manuals and using all features (as more men do) as opposed to working things out without the manual (as more women do) does not have an impact on long-term TF and ability to transfer it to new interfaces. Therefore, the finding that people do not read manuals could be partially explained by the fact that users have found that reading the manual, although it may solve an immediate problem, does not provide them with any real long-term benefit in terms of building their transferable TF.

Our findings showed that younger people were less likely to read manuals than all other age groups. O'Brien *et al*. found that older adults were more likely to perform a task successfully when support was available within their environment. Younger adults were also likely to benefit from such support if it fitted their needs, although they were less likely to use available social support for help with technologies than older adults. All participants were more likely to obtain help synchronously and through informal sources. O'Brien *et al.* suggested that social support is a better option than formal manuals or on-device instruction, especially for older people, and claimed that both low and high TF older adults will accept electronic access to social support if it is easily obtained and understood (2011).

However, this social support needs to be carefully managed if it is to work. A proliferation of special interest sites and user groups online has led to a vast and confusing amount of information being available. Our longitudinal studies suggested that people appear to feel overwhelmed by the idea of accessing casual help through the internet. This practice also carries the risk of incorrect assistance being given which could damage a product, invalidate warranties and increase the likelihood of further negative emotions towards accessing help. It also puts additional burdens on the users in that they are required to have internet access and knowledge in order to use any other type of product.

Ames (2001) described traditional documentation (user guides, online help, reference manuals and print and online tutorials), embedded assistance (text on the user interface, wizards and animated demonstrations) and intelligence (for example, clip-it, the MS Office assistant). If help is revealed in a traditional manner, then our results suggest that there is a high likelihood that it will be perceived as negative. Our findings indicate that help should be displayed to participants in a novel manner such that it does not appear like traditional help and assistance routines. Is it time for a new system that can be built into devices themselves—for instance, a new look at context-sensitive assistance, a wizard or a better intelligent helper? Such options are being investigated for software (Grossman and Fitzmaurice, 2010; Matejka *et al*., 2011; Spannagel *et al*., 2008). For example, Spannagel *et al*. (2008) conducted a study comparing text manuals with animated demonstration for school students and found that animated demonstrations were more effective. Grossman and Fitzmaurice (2010) described a new tool they developed for providing contextual assistance with addition of video in graphics software. They found that it was preferred by users and more effective than a manual for both successfully overcoming problems and completing tasks. They also discussed the potential of video as a medium for crowd-sourcing content that could then be incorporated into the relevant software. Some of these innovations are creeping into software, but so far, there is little evidence of them being applied in commercial products and interfaces, although NZ Telecom has implemented some for smart phones (Telecom, 2013). There is more work to be done to address these issues. For example, broadcast demos such as those used by Telecom and Microsoft (Microsoft Corp., 2013) have potential to become useful video resources.

While the obvious solution to the manual issue is to make all interfaces self-explanatory, this is impossible to do (at least without building the manuals into a help system within the device). Therefore, while improving usability and hence limiting the need to access manuals is ideal, we believe that providing assistance to users is important but that manuals are not the best way to deliver this assistance and help. Help and assistance should be provided in a different form that users will engage with and learn from in a context-relevant, easy and accessible manner.

4.2. Discussion relating to over-featuring

The survey studies showed a difference in behaviour with features between younger and older people, between men and women and between different types of products. However, overall they showed that most of the time, all the features on many types of products are not used, with the 3 score (using as many features as can be figured out without the manual) being the most likely response. Our work provides solid evidence to back up studies that have identified the potential problems of over-featuring (Anton and Potts, 2000; Bishop, 2008; Lee *et al*., 2006; Rust *et al*., 2006), although none of the previous studies had looked at the features people use on domestic products. The longitudinal studies have expanded the discussion and highlighted not only that people rarely use all the features of any product but that excess features are over-crowding the user experience, as evidenced by the majority of experiences mentioned being related to excess features rather than core features. Users can also experience negative emotions from extraneous features. Therefore, it is not just usability that is affected by over-featuring. The emotional experience of interaction is impacted negatively by extraneous features over an extended period of time.

The push for more and more features is generally driven by the need to sell products. Users respond favourably to feature-rich products prior to product purchase (Rust *et al*., 2006), but this can actually translate to lower value during use. 'Consumers think they want feature-loaded offerings when they're shopping. But once they start using their purchase, they suffer feature fatigue: they become overwhelmed by the product's complexity and annoyed by features they realise they don't want or need'. (Rust *et al*., 2006). Our findings suggest that the current practice of pushing ever more advanced features onto users' needs to change.

The problem of adding additional features is 3-fold from our perspective. First, adding more features to a product increases complexity and hence increases chances of errors being made. Second, the extraneous features seem to lead to negative emotional experiences during use. Third, the higher the feature count the higher the chances that users will need help and assistance in learning about the product, forcing them to seek help from the manual or elsewhere, which can in itself lead to further negative experiences.

We are not suggesting that designers avoid including additional features completely or that all mention of features should be excluded from product promotion, but it is about finding the right balance and the correct features for the product. For example, Varland and Svensson (2006) suggested the minimalistic approach to avoid adding too many extra features. Anton and Potts (2000) described requirements engineering, which is intended to assure the appropriateness of system features. Appropriateness includes criteria of completeness, consistency, absence of gold-plating, unambiguity and feasibility. This approach could be used to help keep product interfaces minimalist. McGrenere and Moore (2000) also offered recommendations for designers—eliminate unused functions, relocate or hide those used by only a few, allowing a more flexible or personalizable interface. Bishop (2008) discussed how to remove complexity from interfaces—particularly consumer products—stating it can be removed, re-arranged or hidden. If the level of complexity on the product is necessary, Bishop (2008) suggested that it can be addressed by re-arranging features and functions. For example, the complexity can be shifted out of the user experience into manufacture or automation—and therefore be 'tamed'. Bishop claimed that this critical task is the burden of designers.

McGrenere and Moore (2000) and Redish (1989) cited the training wheels interface—a real but simpler system for users to learn on. This was developed by Carroll (1990) and has been applied to various interfaces since. Novice users are able to complete tasks faster and with fewer errors using this type of reduced interface. This kind of approach was also recommended by Varland and Svensson (2006). They suggested that designers could give users a choice of interface—expert or basic, but they recommended modulating the software so that users with particular needs are able to add their preferred features themselves. We now have adaptable and adaptive interfaces that can allow us to do this.

In addition, some attempts at selling products through emphasizing lack of excess features (e.g. Ive, 2013) have been made, which work more in sync with users' actual needs while still effectively promoting the product. In addition, product launch videos online and even on mainstream broadcasting (TV) are providing hints about how interfaces work (Microsoft Corp., 2013; Telecom, 2013). This is a promising approach to early familiarization of users with the basic workings of a new interface and could be expanded into a more sophisticated version of the training wheels approach, where users are 'primed' by the interface for more complex features during basic tasks with the simpler (core) features. It is also a new help approach that may address some of the issues with manuals.

We believe that products should be designed to perform their core function/s first and foremost. An identification of what these core functions are and how they help to promote positive experiences should be the starting point. If a product performs its core function well, then it may have positive implications on the overall emotional experience, as shown by our longitudinal studies (Gomez, 2013). Rust *et al*. (2006) explained that making products simpler and performing one purpose very well should be the key to success; 'Instead of offering complex products that try to do everything for all customers, provide a variety of simpler products, each tailored to a particular customer segment'. Improved usability will also impact on the manual issue by reducing the need to refer to manuals. The effect of this more positive experience may help to cancel out some of the negative effects of extra features if they are truly desired by users and/or have potential to be truly useful to people.

5. CONCLUSION

This paper focused on two aspects. First, whether and how users relate to manuals and other documentation about how to use products, and second whether people use all the features they are provided with on various products and interfaces and the impact of excess product features on the user–product interaction. We conducted a series of survey studies over 7 years, and two 6-month longitudinal studies. Findings indicate that most users do not read manuals or use all the features provided on products and interfaces. In addition, manuals and excess features were both perceived as producing negative experiences.

Use of the manual and use of all features are linked—for many products, it is very difficult to know about or know how to use all the features without at least some help from the manual. Therefore, the issues that people have with manuals limit their use of features and those feeling overwhelmed by over-featuring may be uninclined to access the manual in order to learn more. Therefore, a vicious cycle is likely to be created, which is ultimately detrimental to the users who are not getting full utility from their products and are experiencing negative emotions in relation to them. Improving interfaces by reducing excess features and improving other aspects of usability should lead to happier users who are satisfied that the interface is more self-explanatory and they do not have as much need to access the manuals.

There were differences found between men and women, more and less educated people and younger and older people as well as product types in both use of manuals and use of features. Further work is required to fine-tune provision of both documentation and interface features to various groups according to their preferences.

Results from our studies do indeed suggest that life is too short to RTFM. We suggest a re-think in the way that features are selected for products, based much more on actual user needs and values. We also suggest that the provision of help and assistance needs a more flexible, responsive and 21st century solution than the traditional manual. Users it seems have already decided that the manual is old hat. We need to catch up.

SUPPLEMENTARY MATERIAL

Supplementary material is available at www.iwcomp.oxfordjournals.org.

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